

September 10, 2009 Request from EPA for additional data presentation from the UMDES.

Garabrant, David

From: Frithsen.Jeff@epamail.epa.gov
Sent: Thursday, September 10, 2009 10:03 AM
To: Garabrant, David
Cc: Franzblau, Alfred; Schaum.John@epamail.epa.gov; Lorber.Matthew@epamail.epa.gov; Kahn.Henry@epamail.epa.gov
Subject: UMich Dioxin Exposure Study: Question concerning Figure 1 in Garabrant et al. 2009, EHP

David:

We have a question we think will help us better understand your results and their applicability to Agency decision-making.

Figure 1 in your 2009 paper (Garabrant et al. 2009, EHP) shows blood TEQ vs age. You have used color to distinguish patterns for males vs. females.

Would it be possible for you to identify those points in this graph that are also associated with residential soils exceeding 1000 ppt?

Let me know what you think. Thanks.

Jeff

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September 11, 2009 UMDES response:

We have created 2 graphs of serum TEQ_{DFP29-2005} by age with the subjects whose soil TEQ_{DFP29-2005} is ≥ 1000 ppt indicated, one graph using the maximum soil concentration and one graph using the house perimeter top 1 inch soil concentration. Two residual plots for each soil concentration graph are also presented.

Figure 1 from the Garabrant 2009 EHP paper (Garabrant DH, et al. 2009. The University of Michigan Dioxin Exposure Study: predictors of human serum dioxin concentrations in Midland and Saginaw, Michigan. Environmental Health Perspectives 117:818-824) is shown below, for reference.

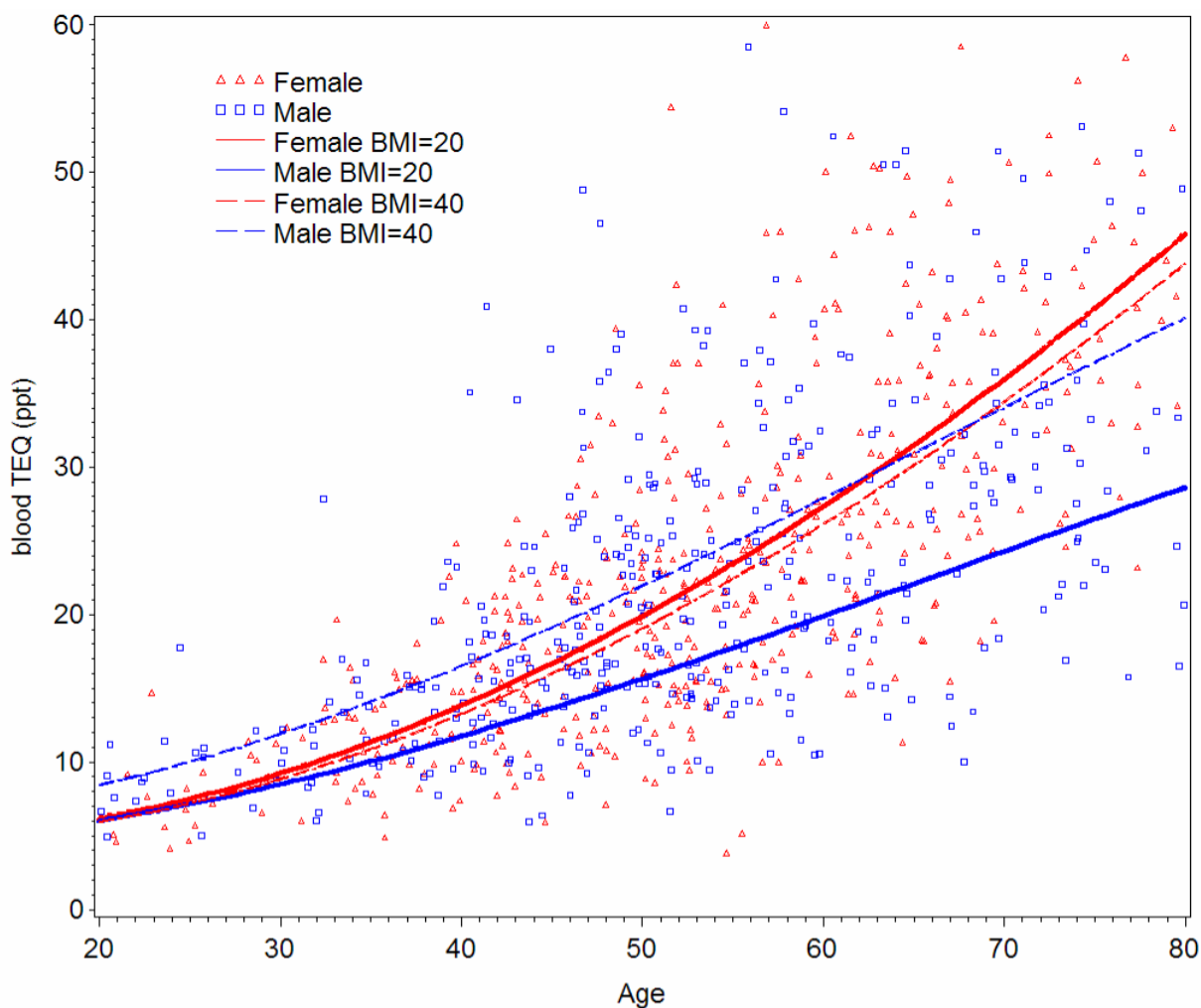
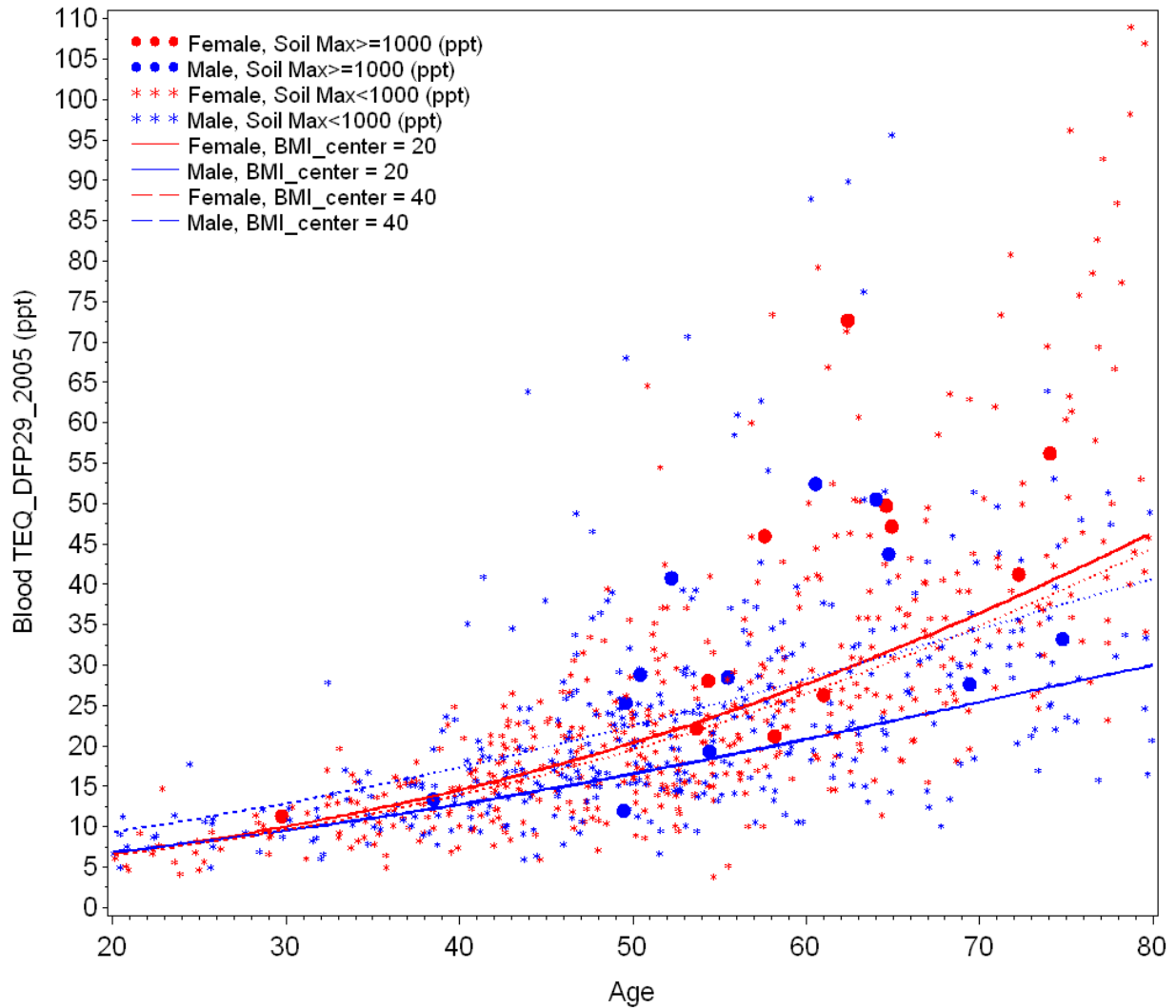


Figure 1. Serum TEQ by age among 946 UMDES participants, with predicted values by age, sex and body mass index. Blood TEQ values are shown only up to the 95th percentile to prevent compression of the scale by outliers.

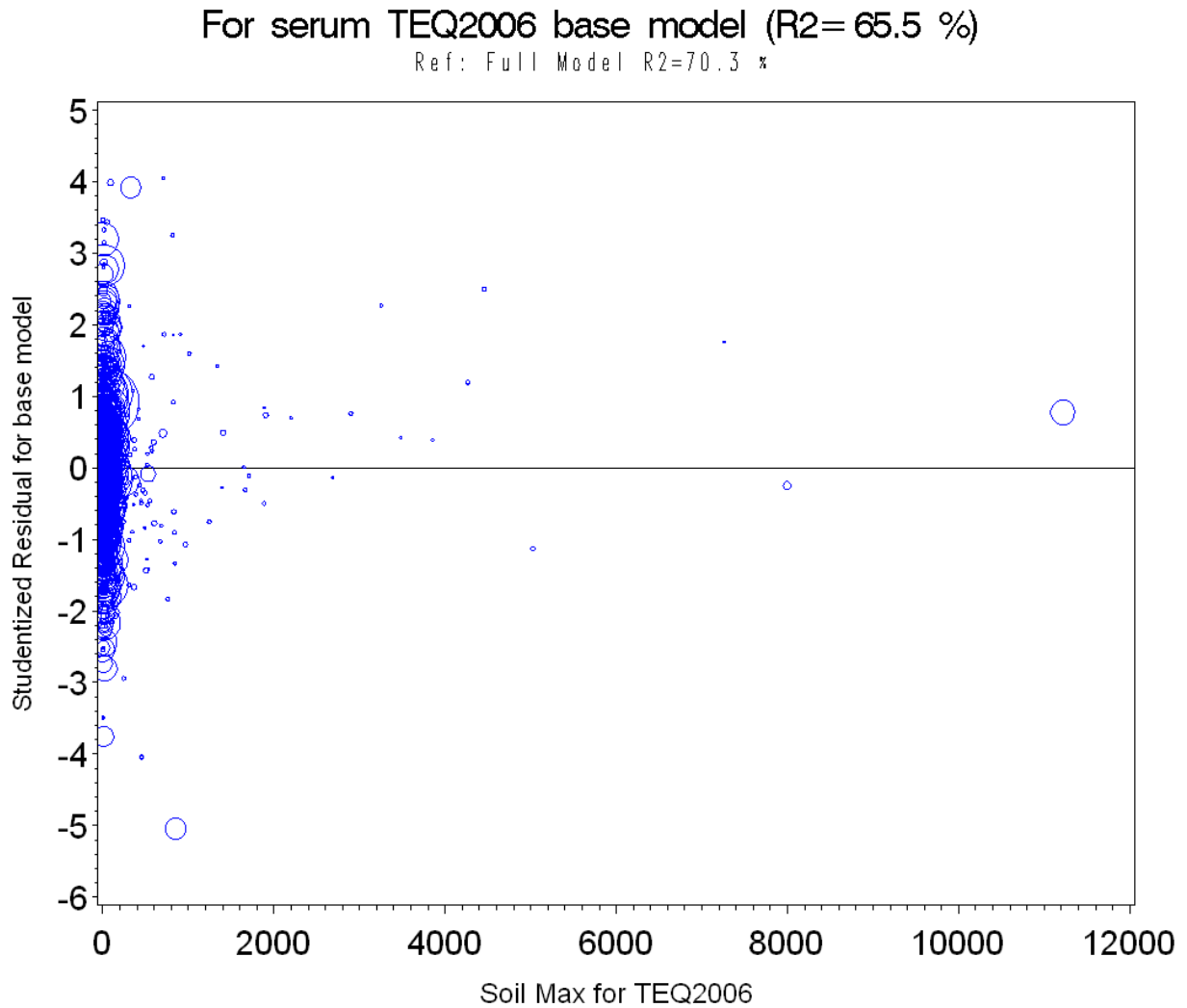
Plot 1: Serum TEQ_{DFP29-2005} by age, identifying subjects whose maximum soil TEQ_{DFP29-2005} is \geq 1000 ppt. (without Clay Lady)



Notes:

1. The maximum soil is the soil sample that has the highest TEQ of all soil samples taken on the participant's property.
2. This plot shows all data points except for the "Clay Lady" whose serum TEQ was 210.7 ppt. She did not have a soil value \geq 1000 ppt. She was omitted from the graph so that the Y axis was not compressed by her high value.

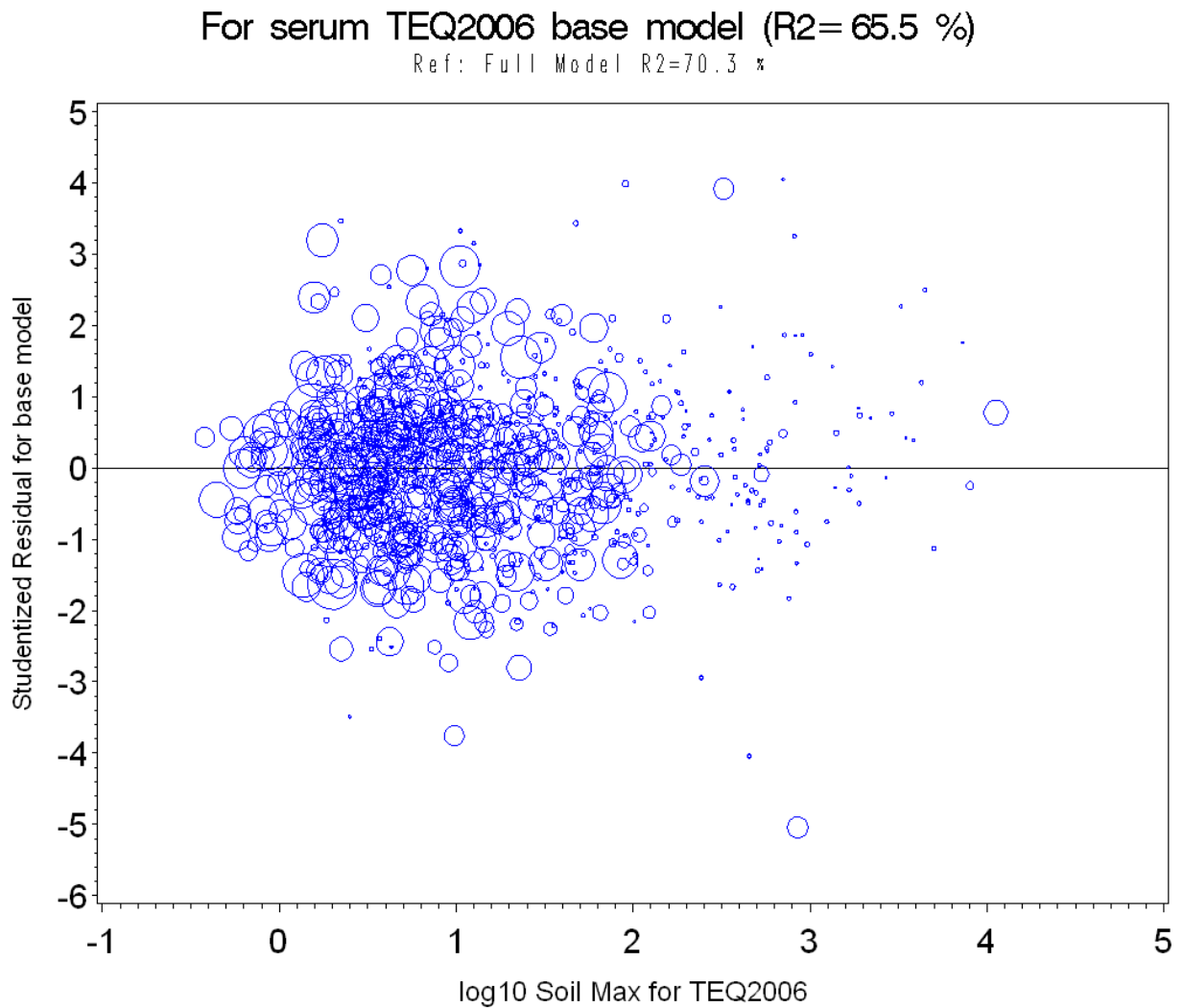
Plot 2: Bubble plot of studentized residuals from base regression model of serum TEQ_{DFP29-2005} versus maximum soil TEQ_{DFP29-2005}.



Notes:

1. The maximum soil is the soil sample that has the highest TEQ of all soil samples taken on the participant's property.
2. The base model is the linear regression model in which $\log_{10}(\text{serum TEQ})$ is the outcome variable, and age, age², sex, BMI, pack-years of smoking, lifetime breast feeding, sex by age interaction, and sex by BMI interaction are independent variables.
3. The size of the bubble is proportional to the survey sample weight of the observation.
4. This plot shows that after accounting for the factors in the base model, there is no relationship between maximum soil TEQ and serum TEQ.
5. This plot shows all data points including the "Clay Lady".

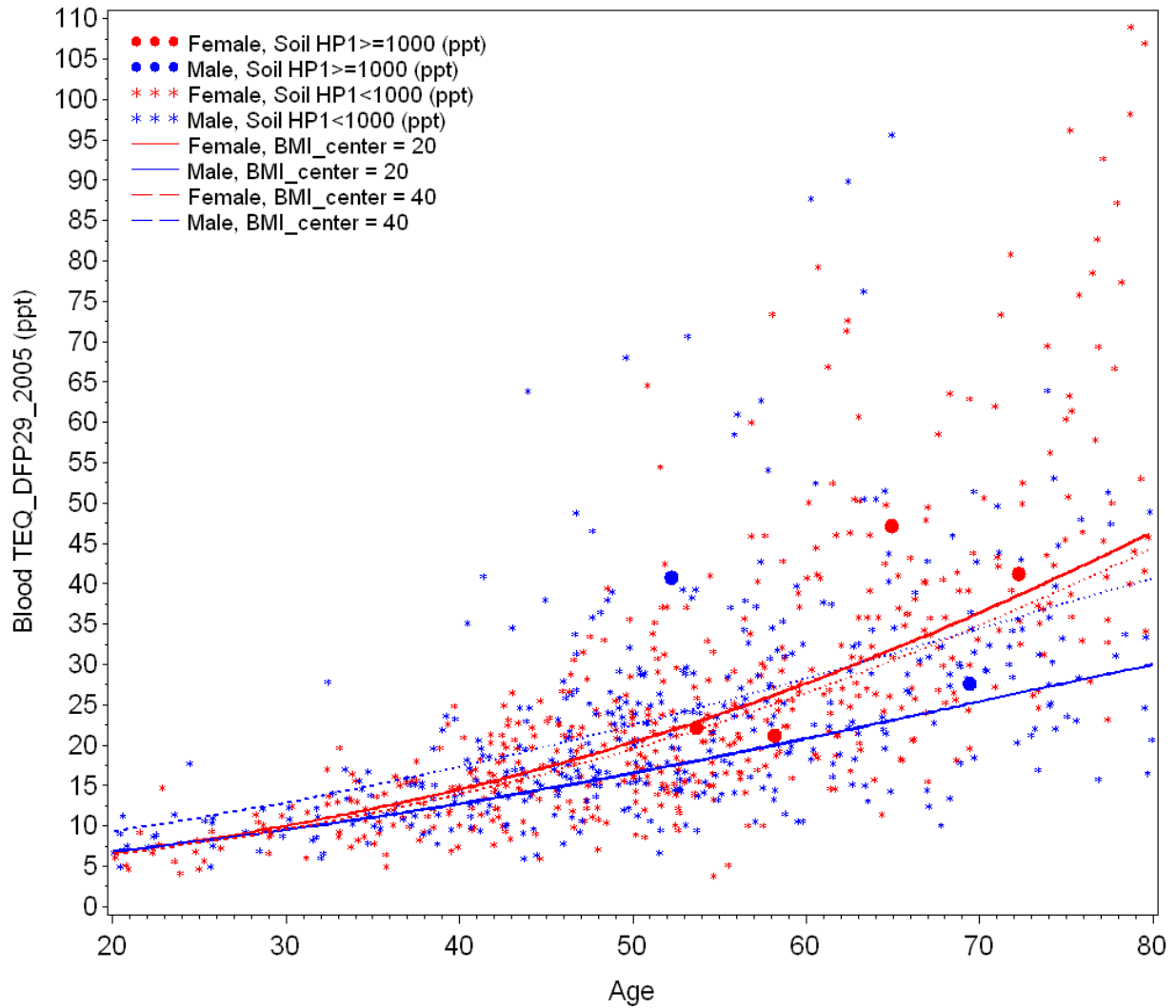
Plot 3: Bubble plot of studentized residuals from base regression model of serum TEQ_{DFP29-2005} versus \log_{10} (maximum soil TEQ_{DFP29-2005}).



Notes:

1. Plot 3 is the same as Plot 2, except that the X axis is now on the \log_{10} scale. This facilitates observation of the values at the left end of the X axis (low soil TEQ concentrations).

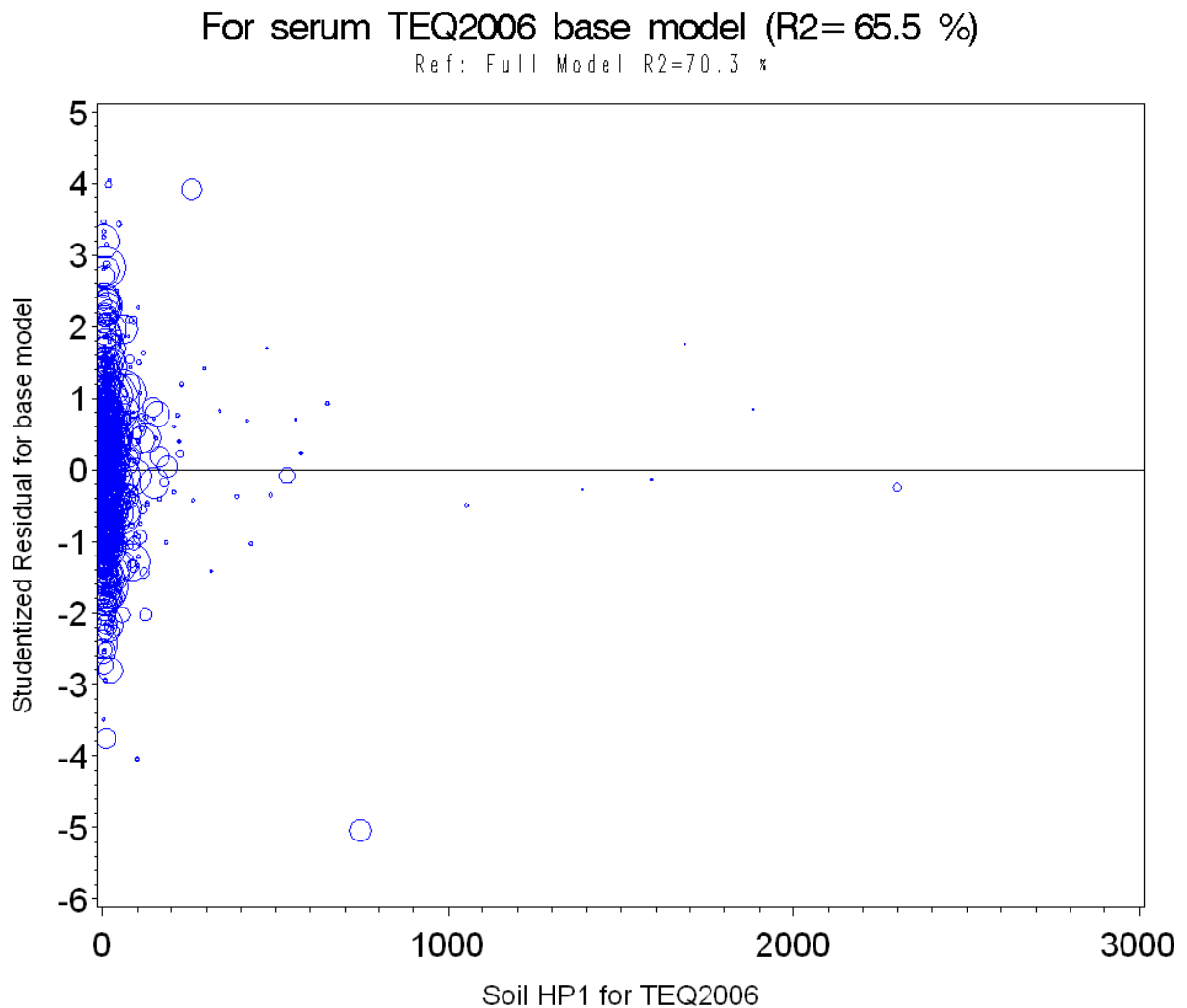
Plot 4: Serum TEQ_{DFP29-2005} by age, identifying subjects whose house perimeter top 1 inch soil TEQ_{DFP29-2005} is ≥ 1000 ppt. (without Clay Lady)



Notes:

1. The house perimeter top 1 inch soil is the homogenized sample of the top 1 inch soil from all soil cores taken on four sides around the house on the participant's property.
2. This plot shows all data points except for the "Clay Lady" whose serum TEQ was 210.7 ppt. She did not have a soil value ≥ 1000 ppt. She was omitted from the graph so that the Y axis was not compressed by her high value.

Plot 5: Bubble plot of studentized residuals from base regression model of serum TEQ_{DFP29-2005} versus house perimeter top 1 inch soil TEQ_{DFP29-2005}.

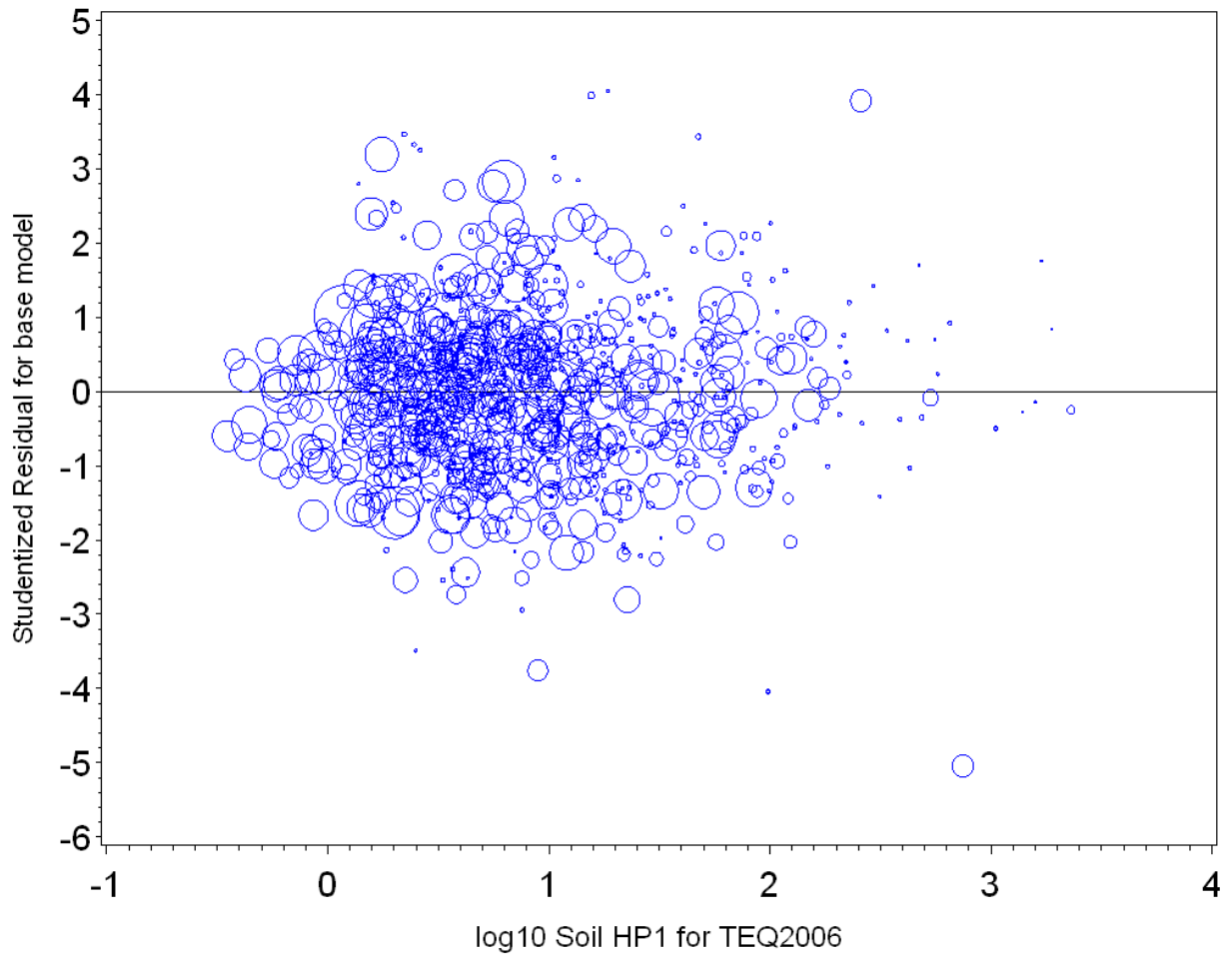


Notes:

1. The house perimeter top 1 inch soil is the homogenized sample of the top 1 inch soil from all soil cores taken on four sides around the house on the participant's property.
2. The base model is the linear regression model in which $\log_{10}(\text{serum TEQ})$ is the outcome variable, and age, age², sex, BMI, pack-years of smoking, lifetime breast feeding, sex by age interaction, and sex by BMI interaction are independent variables.
3. The size of the bubble is proportional to the survey sample weight of the observation.
4. This plot shows that after accounting for the factors in the base model, there is no relationship between house perimeter top 1 inch soil TEQ and serum TEQ.
5. This plot shows all data points including the "Clay Lady".

Plot 6: Bubble plot of studentized residuals from base regression model of serum TEQ_{DFP29-2005} versus \log_{10} (house perimeter top 1 inch soil TEQ_{DFP29-2005}).

For serum TEQ2006 base model (R²= 65.5 %)
Ref: Full Model R²=70.3 %



Notes:

1. Plot 6 is the same as Plot 5, except that the X axis is now on the \log_{10} scale. This facilitates observation of the values at the left end of the X axis (low soil TEQ concentrations).